

**WHAT IS CLAIMED IS:**

- 2 1. A method of determining glucose concentration in a whole blood sample comprising:
  - 4 providing an electrochemical sensor adapted to measure glucose and hematocrit concentrations;
  - 6 measuring the hematocrit concentration of the whole blood sample using the electrochemical sensor via electrochemical impedance spectroscopy;
  - 8 measuring the initial glucose concentration of the whole blood sample using the electrochemical sensor; and
  - 10 calculating the unbiased glucose concentration in the whole blood sample using the initial glucose concentration measurement and the hematocrit concentration.
- 12
- 14 2. The method of claim 1, wherein the glucose concentration of the whole blood sample is determined using an amperometric monitoring system.
- 16
- 18 3. The method of claim 1, wherein the electrochemical sensor includes an insulating base plate, an electrode system on the base plate and a cover adapted to mate with the base plate to form a space in which the electrode layer is available to contact the whole blood sample.
- 20
- 22 4. The method of claim 3 further including a reaction layer comprising an enzyme that reacts with the glucose in the whole blood sample.
- 24
- 26 5. The method of claim 4, wherein the enzyme in the reaction layer is combined with a hydrophilic polymer.
- 28 6. The method of claim 1, wherein the method of determining glucose concentration in a whole blood sample occurs in disposable self-testing systems.

7. The method of claim 1, wherein the method of determining glucose  
2 concentration in a whole blood sample occurs in a clinical analyzer.

4 8. The method of claim 1, wherein the measuring of the hematocrit  
concentration in the whole blood sample is performed before measuring the initial  
6 glucose concentration.

8 9. The method of claim 1, wherein the measuring of the hematocrit  
concentration of the whole blood sample is performed using a single frequency  
10 measurement.

12 10. The method of claim 1, wherein the measuring of the hematocrit  
concentration of the whole blood sample is performed using a plurality of frequency  
14 measurements.

16 11. The method of claim 1, wherein the measuring of the hematocrit  
concentration is performed using a phase shift of an impedance measurement.

18 12. The method of claim 11, wherein the measuring of the hematocrit  
20 concentration is performed with at least one frequency between about 800 and about 900  
Hz.

22 13. The method of claim 1, wherein the measuring of the hematocrit  
24 concentration is performed using magnitude components of an impedance measurement.

26 14. The method of claim 13, wherein the measuring of the hematocrit is  
performed with at least one frequency between about 300 and about 10,000 Hz.

28 15. The method of claim 1 further including applying AC waveforms from  
30 about 1 to about 10,000 Hz to the electrochemical sensor.

2        16. The method of claim 1 further including applying AC waveforms from  
about 1 to about 100mV to the electrochemical sensor.

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6        17. The method of claim 1 further applying AC waveforms that are  
subsequently deconvoluted using a Fourier transform.

8        18. A method of determining glucose concentration in a whole blood sample  
comprising:

10        providing an electrochemical sensor adapted to measure glucose and hematocrit  
concentrations;

12        measuring the hematocrit concentration of the whole blood sample using the  
electrochemical sensor via electrochemical impedance spectroscopy using an  
14 amperometric monitoring system;

16        measuring the initial glucose concentration of the whole blood sample using the  
electrochemical sensor; and

18        calculating the unbiased glucose concentration in the whole blood sample using  
the initial glucose concentration measurement and the hematocrit concentration.

20        19. The method of claim 18, wherein the method of determining glucose  
concentration in a whole blood sample occurs in disposable self-testing systems.

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24        20. The method of claim 19, wherein the measuring of the hematocrit  
concentration of the whole blood sample is performed using a single frequency  
measurement.

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28        21. The method of claim 19, wherein the measuring of the hematocrit  
concentration of the whole blood sample is performed using a plurality of frequency  
measurements.

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22. The method of claim 19, wherein the measuring of the hematocrit  
2 concentration is performed using a phase shift of an impedance measurement.

4 23. The method of claim 22, wherein the measuring of the hematocrit  
concentration is performed with at least one frequency between about 800 and about 900  
6 Hz.

8 24. The method of claim 19, wherein the measuring of the hematocrit  
concentration is performed using magnitude components of an impedance measurement.  
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12 25. The method of claim 24, wherein the measuring of the hematocrit is  
performed with at least one frequency between about 300 and about 10,000 Hz.

14 26. The method of claim 19 further including applying AC waveforms from  
about 1 to about 10,000 Hz to the electrochemical sensor.  
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18 27. The method of claim 19 further including applying AC waveforms from  
about 1 to about 100mV to the electrochemical sensor.

20 28. The method of claim 19 further applying AC waveforms that are  
subsequently deconvoluted using a Fourier transform.